The Nebula near Merope.—In *Astronomische Nachrichten*, No. 3024, Prof. Pritchard states that the nebula close south and following Merope, which Prof. Barnard observed on November 14, and announced as a discovery in *Astr. Nach.*, No. 3018, is plainly impressed on photographic plates taken at Oxford Observatory, with exposures varying from 20 to 120 minutes. Prof. Barnard believed that the exposure which would be necessary to produce an image of the nebula would so extend the diameter of the image of Merope that the two objects would coalesce. Prof. Pritchard, however, finds that stars of the 14th magnitude are perfectly distinct on plates taken with the above-mentioned exposures, and that the stellar disks of Merope in such cases vary from 20″ to 30′ in diameter. Since the supposed new nebula is some 40″ distant from Merope, the separation of the two objects is always plainly marked.

Comet *a* 1891.—The comet of which Mr. Denning announced the discovery in the last issue of Nature (p. 516) is probably identical with one independently discovered by Prof. Barnard, of Lick Observatory, on Tuesday, March 31.

BIOLOGICAL NOTES.

The Eyes in Blind Crayfishes.—The minute structure of the eyes of two species of blind crayfish have been very thoroughly investigated by G. H. Parker, under the direction of Prof. Mark. Mr. Parker is the Instructor in Zoology at the Harvard College Museum. The species were *Cambarus setosus*, a new species recently described by Dr. Walter Faxon, from caves in South-western Missouri, and *C. pellucidus*, Tellk., the well-known species from Mammoth Cave. After a short *résumé* of the investigations of Newport and Leydig, the author states that the principal questions concerning the eyes of blind crayfishes turn on their amount of degeneration; not only has the finer structure of the retina been affected, but the shape of the optic stalks has been altered. The optic stalks are not only proportionally smaller than those of crayfishes possessing functional eyes, but they have in these two cases characteristically different shapes. In crayfishes with fully developed eyes the stalk is terminated distally by a hemispherical enlargement; in the blind crayfishes it ends as a blunt cone. In both forms of crayfishes the optic ganglion and nerve were present, the latter terminating in some way undiscoverable in the hypodermis of the retinal region. In *C. setosus* this region is represented only by undifferentiated hypodermis, composed of somewhat crowded cells, while in *C. pellucidus* it has the form of a lenticular thickening of the hypodermis, in which there exists multinuclear granulated bodies; these are shown to be degenerated clusters of cone-cells. (*Bulletin of the Museum of Comparative Anatomy at Harvard College*, vol. xx. No. 5, November 1890.)

A New Stalked Crinoid.—The United States Acting Fish Commissioner was engaged during 1887 in dredging operations between Panama and the Galapagos Islands. One haul, taken from a depth of 392 fathoms, off Indefatigable Island, one of the Galapagos group, brought up three imperfect specimens of a most interesting stalked Crinoid. At a first glance, it might readily pass for a living representative of the fossil Apiocrinus; but on a closer scrutiny it showed some features which ally it with Millericrinus, and others with Hyocrinus and Rhizocrinus. Prof. Alexander Agassiz, who hopes very soon to publish a detailed account of this form, with figures, thinks that it shows structural features of all the above mentioned genera. It has, like Hyocrinus and Rhizocrinus, only five arms; they are, however, not simple, but send off, from the main stem of each arm, three branches to one side and two to the other. The system of interradial plates is highly developed, as in Apiocrinus and Millericrinus, six rows of solid polygonal imperforate plates being closely joined together, and uniting the arms into a stiff calyx as far as the sixth or seventh radial and to the third or fourth joints of the first and second pinnules. The interradial calycinal plates extend along the arms for a considerable distance beyond the first branch. The stem tapers very gradually, and in its general appearance recalled that of Apiocrinus; it expanded towards the base, but the actual attachment was not found. The stem must have been about from 26 to 27 inches in height; the height of the calyx to the interradials is 7/16 of an inch; its diameter at the inner base of the second radials is 11/16 of an inch, and at the height of the third joint of the second pinnule 1 inch. The arms were about 8 inches in length. It is named *Calamocrinus diomedæ*, after the steamer *Albatross*.

British Marine Algæ.—Almost forty years have passed since the issue of the last part of Harvey's "Phycologia Britannica." The publication of this work extended over five years, and it enumerates 388 species. In the preface to the first volume the author not obscurely hints at the existence of other forms, "some few but distinct looking, preserved in my own and other herbaria," remaining over for further research; but the time for this never came. During the years that have elapsed since 1851, though the labourers in this field of botany do not appear to have greatly increased, the methods of modern research have added to our exact knowledge of the subject, and the investigations of Agardh, Bornet, Flahault, Gomont, Grunow, Schmitz, Reinke, and others, have thrown a flood of light on the minute structure, fructification, and classification of the species of this group. Although the time has not yet, in our opinion, come for a new edition of Harvey's work, yet it is with extreme satisfaction that we notice the publication of "a revised list" of our British marine Algæ, which is the result of the joint labours of Messrs. E. M. Holmes and E. A. L. Batters. None but those who have engaged in such work can appreciate the immense amount of labour and care which is needed to bring such a list even fairly up to date, and when, as in the present instance, most of the additions to the known native species have been made by the individual efforts in collecting of the authors, it must add to the appreciation with which this revised list will be received by botanists. As a matter of necessity, for the present, any classification must be regarded as only provisional, but the authors have been enabled to give the very best one possible, and one quite in accordance with recent investigations. Exclusive of all varieties, the number of species recorded in this revised list is 536, after excluding some six forms, like *Sargassum bacciferum* and *S. vulgare*, which have only been met with as waifs. In the classification of the Cyanophyceæ, the authors have as to the Nostochinæ followed, with few exceptions, the guiding of Bornet, Flahault, and Gomont. In the Chlorophyceæ, while the researches of Agardh and Wille have not been overlooked, yet it can scarcely be doubted but that much new work is needed ere the numerous species of Chætomorpha and Cladophora can be satisfactorily described or arranged. Reinke has been in part followed in the arrangement of the Phæophyceæ, but in some orders of this group a good deal of additional information is needed ere a generally acceptable determination of even the limits of its genera is obtained. In the Rhodophyceæ the classification of Schmitz has been generally adopted, but we still wait expectingly for the final views of Schmitz on the group. In the working out of the details a great deal of trouble has been taken in the determination of the often very numerous varieties, and this will be an important help to the worker. An attempt has been made to give a general idea of the geographical distribution by dividing the coast-line of Great Britain and Ireland into fourteen sections, and then indicating in which of these the species or its varieties are or have been found. In an appendix a list of species known to occur either on the Atlantic shores of France or of Norway, or in the Baltic, and which one might expect to meet with on our own shores, is given, and will prove useful. Possibly Mediterranean forms may yet be met with, other than waifs, on the south-west shore of Ireland, a part of the coast-line hardly as yet investigated. Miss Hutchins collected in portions of Bantry Bay, and Miss Ball in the Youghal district, but the intervening coast has only as yet been casually visited. It is to be hoped and expected that one result of the publication of this most useful list will be to stir up enthusiasm in the collecting and study of our native species. This list appears in the *Annals of Botany* for December 1890.

Comparative Zoology Museum, Harvard.—The Annual Report of the Curator for the session 1889–90 has just reached us, and like all the annual reports from the pen of Alexander Agassiz it is full of interest. The geological section of the Museum, containing the exhibition-rooms and additional laboratories of the department, is now ready for use. On the first floor it contains a large lecture-room, capable of seating 320 students. On the second floor are placed the petrographical laboratories, one for general use, the other for advanced students. In the basement are the chemical laboratories, photographic rooms, &c.; while on a fourth floor are laboratories for the physical geography department. A view of the University Museum, as seen facing the north-west corner, including the newly erected mineralogical sections, is given. On the very evident ground of safety to the collections it has been arranged

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that no specimens be loaned even to specialists, and that for the future specialists must visit the collections, which will be freely placed in the Museum at their disposal. The reports of the various officers of departments are given, and all will congratulate the Curator on the great progress that this splendid Museum has made.

MECHANICAL TRISECTION OF ANY ANGLE.

THE following discussion gives simple methods of directly trisecting angles which do not exceed 180°. The relations on which the methods are based, hold, however, up to 270°, but it would be difficult to apply them far beyond 180°.

For angles greater than 180°, the excess over 180° can be trisected, and 60° added by laying off on the arc a distance equal to the radius.

Fundamental Relations.

With any angle, PCK, less than 180° (Fig. 1), if one-third of the angle is represented by KCX, and if, from any point I on the prolongation of one side PC, an arc, IKC′, is described with the vertex C as a centre, the chord IC′ makes with CC′ an angle equal to half PCC′, and therefore equal to KCC′, one-third the original angle.

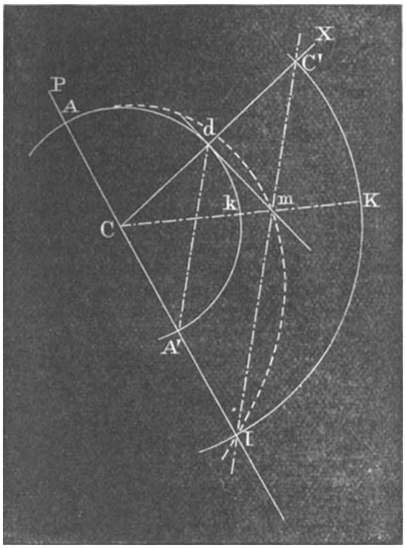

FIG. 1.

The intersection *m* of the radius CK and the chord IC′ is hence :—

(i.) Equidistant from the points C and C′.

(ii.) On a perpendicular to CC′ at its middle point.

The first relation (i.) gives a means of readily plotting the point of trisection, whether on paper or in the field ; the second relation suggests a simple instrument for trisecting an angle without describing an arc.

(1) To lay off one-third a given angle.

Assume any angle, PCK, less than 180° (Fig. 2), and describe an arc with any radius, CI, the vertex C being taken as a centre.

From the point I, where the arc intersects the prolongation of one side, PC, of the angle, draw right lines intersecting the other side, CK. From the points of intersection, *m*′, *m*″, *m*‴, &c., lay off, in a direction away from I, distances *m*′E′, *m*″E″, &c., equal to the distances of *m*′, *m*″, *m*‴, &c., respectively, from the centre C.

Only such lines need be drawn that the extremities will lie near the arc, both within and without, and the curve plotted by these points intersects the arc at the point C′, trisecting the arc PK.

The trisecting point of the supplementary arc KI lies 60° from C′.

(2) From the second relation (ii.) it is evident that the following simple instrument would accomplish the trisection.

Two equal arms, CI and CC′, are jointed at C (Fig. 3) ; one arm has a projection forming a right angle at *d*, and the other arm is prolonged at CA beyond the joint. Points I and C′ on the two arms, at twice the distance C*d* from the centre, are connected by an elastic cord.

Placing the point C over the vertex of any angle, PCK, less than 180°, with the edge CA extended along one side, CP, the other arm is moved until the point of intersection, *m*, of the cord with the perpendicular, *dm*, is over some point on the other side, CK.

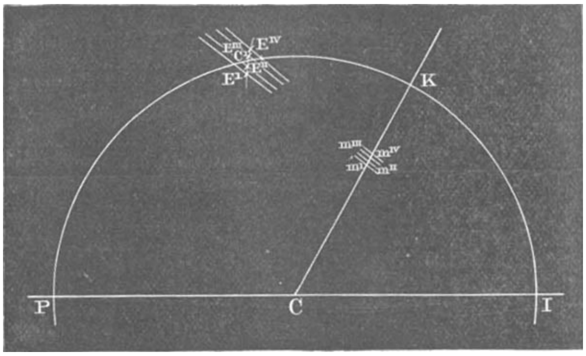

FIG. 2.

A line ruled along the edge CC′ will form an angle with CK equal to one-third PCK.

Instead of a cord connecting I and C′, a ruler may be used. The edges AI and CC′ of the two arms are radial from the centre of motion C.

The angles made by the lines C*m* and I*m* with the right-angled projection *dm*, correspond to angles of incidence and reflection if a plane mirror facing towards C is substituted for the projecting piece.

An observer sighting on an object K, the arm CA being directed upon another object P, swings the arm C*d* until he brings the reflection of the point I in the direction of the point K.

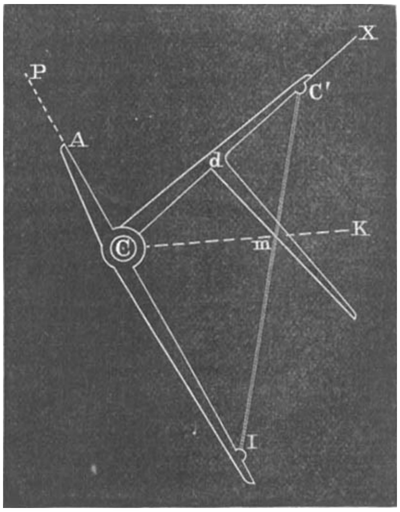

FIG. 3.

Then, sighting in a direction perpendicular to the mirror, he can lay off the angle KCX, one-third the angle PCK.

An instrument of this character suggested the above constructions.

The locus of the point *m* is partially shown in dotted lines in Fig. 1. Its polar equation is evidently $r = a \sec \frac{1}{3}\phi$, a representing the distance C*d* (Fig. 1) ; ϕ, the angle PCK.

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